

## CLAIMS

That Which is Claimed is:

1. A polymer structure comprising:  
a polymeric matrix having a plurality of cells therein, wherein the cells in the plurality of cells have an average diameter of from about 1 to 25 nm.
2. The polymer structure of Claim 1, wherein the cells in the plurality of cells have an average diameter of from about 2 to 20 nm.
3. The polymer structure of Claim 1, wherein the cells in the plurality of cells have an average diameter of from about 3 to 15 nm.
4. The polymer structure of Claim 1, wherein the cells in the plurality of cells have an average diameter of from about 4 to 12 nm.
5. The polymer structure of Claim 1, wherein the cells in the plurality of cells have an average diameter of from about 3 to 10 nm.
6. The polymer structure of Claim 1, wherein the cells in the plurality of cells have an average diameter of from about 5 to 8 nm.
7. The polymer structure of Claim 1, wherein the plurality of cells comprise closed cells.
8. The polymer structure of Claim 1, wherein the polymeric matrix comprises a polymer selected from the group consisting of a polystyrene, a polyimide, a fluoropolymer, a poly(arylene)ether, a polyphenylene, SiLK<sup>TM</sup>, and combinations thereof.
9. The polymer structure of Claim 1, wherein the polymeric matrix has a dielectric constant of about 1.5 to 3.5.

10. The polymer structure of Claim 1, wherein the polymeric matrix has a density of cells from about 0.2 to 1 g/cm<sup>3</sup> polymeric material.

11. A microelectronic device comprising:  
a dielectric material that comprises a polymeric matrix having a plurality of cells therein, wherein the cells in the plurality of cells have an average diameter of from about 1 to 25 nm.

12. The microelectronic device of Claim 11, wherein the cells in the plurality of cells have an average diameter of from about 2 to 20 nm.

13. The microelectronic device of Claim 11, wherein the cells in the plurality of cells have an average diameter of from about 3 to 15 nm.

14. The microelectronic device of Claim 11, wherein the cells in the plurality of cells have an average diameter of from about 4 to 12 nm.

15. The microelectronic device of Claim 11, wherein the cells in the plurality of cells have an average diameter of from about 3 to 10 nm.

16. The microelectronic device of Claim 11, wherein the cells in the plurality of cells have an average diameter of from about 5 to 8 nm.

17. The microelectronic device of Claim 11, wherein the plurality of cells comprise closed cells.

18. The microelectronic device of Claim 11, wherein the polymeric matrix comprises a polymer selected from the group consisting of a polystyrene, a polyimide, a fluoropolymer, a poly(arylene)ether, a polyphenylene, SiLK<sup>TM</sup>, and combinations thereof.

19. The microelectronic device of Claim 11, wherein the dielectric material has a dielectric constant of about 1.5 to 3.5.

20. The microelectronic device of Claim 11, wherein the polymeric matrix has a density of cells from about 0.2 to 1 g/cm<sup>3</sup> polymeric material.